IMPACT OF EXTREME TEMPERATURES ON GROWTH AND PHOTOSYNTHETIC PERFORMANCE OF ADVANCED COTTON GENOTYPES Gurpreet Virk John L. Snider Peng Chee Navneet Kaur Alessandro Ermanis University of Georgia

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<u>Abstract</u>

Crossing elite breeding lines produces progeny with a range of traits and those traits can be exploited in future crosses to drive genetic improvement. Seedling vigor is an important characteristic because it improves seedling competitiveness and minimizes risk of early-season stand loss. Growth temperature and genotype can influence seedling vigor in cotton. Identifying genotypes that can perform well under different temperature extremes can broaden the range of temperatures over which optimum growth could be obtained. To this end, a growth chamber study was conducted at the Georgia Envirotron, to evaluate the temperature response of advanced breeding lines representing four populations. Growth chambers were set at day/night growth temperature regimes of sub optimal (20/15°C), optimal (30/20°C), and two supra-optimal (35/25°C; 40/30°C) temperatures. At two weeks after planting, growth analysis, chlorophyll fluorescence (OJIP), and pigment concentrations were obtained from each experimental unit. For growth analysis data, a significant effect of temperature, line and their interaction was observed. The fluorescence measurements were sub categorized as structural indicators, specific fluxes, quantum efficiencies and performance indices. The measured OJIP parameters and pigment concentrations were all significantly affected by early season growth temperature. All the measured growth parameters were highest for seedlings grown at 35°C and lowest for seedlings grown under sub-optimal temperatures. All the quantum efficiencies were significantly affected by temperature, but each component differed in heat sensitivity. Both seedling dry weight and leaf area had a significant positive association with all three measured quantum efficiencies, suggesting the use of OJIP fluorescence as quick indicator of early season vigor compared to time consuming dry weight, and leaf area measurements.